Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Non-Equilibrium Plasma Dynamics Modeling of Xenon Clusters Irradiated by an Intense Laser Pulse[1] TZVETELINA PETROVA, KENNETH WHITNEY, Berkeley Research, Inc., GEORGE PETROV, JACK DAVIS, Naval Research Laboratory — Population inversions have been experimentally observed when small xenon clusters of 5-20 atoms are irradiated by ∼230 fs high intensity laser of 10^{19} W/cm^2 and wavelength of 248 nm [1]. Consequently, a plasma channel ∼1.5-2 cm in length and ∼1.5–2 μm in diameter is formed which produces amplified x-ray emissions with gains ∼20-60 for wavelengths in the range 2.71-3 Å. It has been conjectured [2], that population inversions in laser generated xenon plasmas may be efficiently created within M-shell ionization stages by photo- or collisional-ionization of 2s and 2p inner shell electrons. In this study we focus our attention on the influence of non-Maxwellian electron energy distributions on the collisional dynamics by which hollow atoms are generated in different ionization stages of xenon. These distributions are calculated from a relativistic molecular dynamics model.

[1] A. B. Borisov, *et al.*, J. Phys. B **40**, F307 (2007).
[2] W. A. Schroeder, *et al.*, J. Phys. B **34**, 297 (2001).

[1]Work supported by NRL under the 6.1 program.

Tzvetelina Petrova
Berkeley Research, Inc

Date submitted: 17 Jul 2009 Electronic form version 1.4